

Listing of the Claims

1. (Currently Amended) A radio frequency coil ~~(44, 44', 44'', 144, 154)~~ comprising:

a substrate ~~(72)~~;

a radio frequency antenna (90) disposed on the substrate ~~(72)~~; and

an electronics module ~~(78, 78')~~ disposed on the substrate ~~(72)~~ and electrically connected with the radio frequency antenna ~~(90)~~.

2. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1, wherein:

the electronics module ~~(78, 78')~~ is disposed on a central region (96) of the substrate ~~(72)~~; and

the radio frequency antenna ~~(90)~~ includes a conductor disposed on the substrate ~~(72)~~ outside of and at least partially surrounding the central region (96) of the substrate ~~(72)~~.

3. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 2, wherein the conductor of the radio frequency antenna (90) comprises:

a conductive film disposed on the substrate ~~(72)~~ defining at least one conductive loop ~~(90)~~ substantially surrounding the central region of the substrate ~~(72)~~, ends (100) of said at least one conductive loop ~~(90)~~ extending into the central region (96) of the substrate ~~(72)~~ and connecting with the electronics module ~~(78, 78')~~.

4. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 3, wherein the substrate ~~(72)~~ comprises:

a flexible electrically insulating material.

5. (Currently Amended) The radio frequency coil ~~(44', 144, 154)~~ as set forth in claim 3, wherein the electronic module ~~(78')~~ comprises:

printed circuitry ~~(110)~~ disposed on the substrate ~~(72)~~; and

one or more discrete circuit components ~~(112, 114, 116)~~ electrically connected via the printed circuitry ~~(110)~~.

6. (Currently Amended) The radio frequency coil ~~(44'', 144, 154)~~ as set forth in claim 2, further comprising:

at least one spacer element ~~(130)~~ disposed between the substrate ~~(72)~~ and the electronics module ~~(78)~~, the at least one spacer element ~~(130)~~ defining a spacing (D_{spe}) between the electronics module ~~(78)~~ and the radio frequency antenna ~~(90)~~.

7. (Currently Amended) The radio frequency coil ~~(44'', 144, 154)~~ as set forth in claim 6, wherein the spacing (D_{spe}) is at least about one-fifth of a lateral dimension (W_{rnt}) of radio frequency antenna ~~(90)~~.

8. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 2, wherein the electronics module ~~(78, 78')~~ has a lateral dimension (W_{elec}) that is less than or about three-fifths of a lateral dimension (W_{coil}) of the radio frequency antenna ~~(90)~~.

9. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1, wherein the electronic module ~~(78, 78')~~ comprises:

a wireless transmitter ~~(116, 126)~~ transmitting a transmission signal representative of a radio frequency signal received by the radio frequency antenna ~~(90)~~.

10. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1, wherein the electronic module ~~(78, 78')~~ comprises:

a one or more noisy circuit components ~~(114)~~ generating substantial radio frequency interference;

one or more quiet circuit components ~~(112, 116)~~ not generating substantial radio frequency interference; and

a radio frequency shield ~~(120)~~ disposed around the one or more noisy circuit components ~~(114)~~ but not around the one or more quiet circuit components ~~(112, 116)~~.

11. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 10, wherein:

the radio frequency antenna ~~(90)~~ defines a loop surrounding a central region ~~(96)~~ of the substrate ~~(72)~~; and

the radio frequency shield ~~(120)~~ is disposed substantially centered in the central region ~~(96)~~ of the substrate ~~(72)~~.

12. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1, wherein the electronic module ~~(78, 78')~~ does not include a ground plane.

13. (Currently Amended) The radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1, wherein inductors ~~(112)~~ of the electronic module ~~(78, 78')~~ are selected from a group consisting of:

toroidal inductors ~~(112)~~, and

solenoidal inductors with balanced turns.

14. (Currently Amended) A radio frequency coils array ~~(40, 140, 150)~~ comprising:

a plurality of radio frequency coils ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 2 arranged such that the radio frequency antennae ~~(90)~~ of the plurality of radio frequency coils ~~(44, 44', 44'', 144, 154)~~ span a coil array surface.

15. (Currently Amended) The radio frequency coils array ~~(40)~~ as set forth in claim 14, wherein the substrates ~~(72)~~ of at least some of the plurality of radio frequency coils ~~(44, 44', 44'')~~ are tilted with respect to the substrates ~~(72)~~ of other coils of the plurality of radio frequency coils ~~(44, 44', 44'')~~ such that the coil array surface is non-planar.

16. (Currently Amended) The radio frequency coils array ~~(40, 150)~~ as set forth in claim 14, wherein at least one coil of the plurality of radio frequency coils ~~(44, 44', 44'', 154)~~ is entirely surrounded by other coils of the plurality of radio frequency coils ~~(44, 44', 44'', 154)~~.

17. (Currently Amended) The radio frequency coils array ~~(40, 150)~~ as set forth in claim 14, wherein the plurality of radio frequency coils ~~(44, 44', 44'', 154)~~ are arranged in an N×M array where N>2 and M>2.

18. (Currently Amended) The radio frequency coils array ~~(40, 150)~~ as set forth in claim 14, wherein at least some of the coils of the plurality of radio frequency coils ~~(44, 44', 44'', 154)~~ share a common substrate.

19. (Currently Amended) A magnetic resonance imaging system comprising:
a main magnet ~~(20)~~ producing a substantially temporally constant main magnetic field within a field of view;
magnetic field gradient coils ~~(30)~~ that impose selected magnetic field gradients on the main magnetic field within the field of view;
a means ~~(32, 54)~~ for applying a radio frequency pulse to the field of view; and
at least one radio frequency coil ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1 arranged to detect a magnetic resonance signal induced by the applied radio frequency pulse.

20. (Currently Amended) A magnetic resonance imaging method comprising:
exciting magnetic resonance in an imaging subject ~~(16)~~; and
receiving a magnetic resonance signal using one or more radio frequency coils ~~(44, 44', 44'', 144, 154)~~ as set forth in claim 1 with the radio frequency antenna ~~(90)~~ of each coil in proximity to the imaging subject ~~(16)~~.